

## WHAT IS CLAIMED IS:

1. An attitude control system for a spacecraft, comprising:  
a supply of oxidizer;  
at least one nozzle;  
a conduit fluidly coupling the supply of oxidizer and the nozzle, wherein the  
5 conduit provides a pathway for oxidizer to flow in a downstream direction from the  
supply of oxidizer toward and into the nozzle;  
a pressure regulator coupled to the conduit and interposed between the  
supply of oxidizer and the nozzle, wherein the pressure regulator regulates the  
pressure of oxidizer at a location downstream of the pressure regulator and  
10 upstream of the nozzle to a set point pressure at or below a first pressure, wherein  
the first pressure comprises the pressure required to maintain the oxidizer in a gas  
state to ensure that the any oxidizer flowing through the conduit is in a gas state  
prior to entering the nozzle.
- 15 2. The system of claim 1, wherein the oxidizer comprises Nitrous Oxide.
3. The system of claim 2, wherein the supply of oxidizer contains Nitrous  
Oxide simultaneously in both a gas state and a liquid state.
- 20 4. The system of claim 3, wherein oxidizer located in the conduit  
upstream of the pressure regulator is in a liquid state.
5. The system of claim 3, wherein oxidizer located in the conduit  
upstream of the pressure regulator is in both a liquid state and a gas state.
- 25 6. The system of claim 1, wherein the first pressure is the vapor pressure  
of the oxidizer at a given temperature.
7. The system of claim 1, wherein the supply of oxidizer comprises at  
30 least one propellant tank.

8. The system of claim 7, wherein the supply of oxidizer comprises a plurality of propellant tanks.

5 9. The system of claim 8, wherein the conduit includes a manifold that connects all of the fuel tanks to the nozzle.

10 10. The system of claim 8, wherein the at least one nozzle includes a plurality of nozzles.

11. The system of claim 1, further comprising a hybrid rocket motor, wherein the conduit supplies oxidizer to the hybrid rocket motor.

12. A method of generating thrust for a spacecraft, comprising:  
15 providing a supply of oxidizer, wherein the supply of oxidizer contains oxidizer in both a liquid state and a gas state;

flowing oxidizer from the supply of oxidizer to a hybrid rocket motor of the spacecraft;

20 flowing oxidizer from the supply of oxidizer to a nozzle of an attitude control system of the spacecraft; and

regulating the pressure of oxidizer flowing to the attitude control system, wherein the pressure is regulated to a pressure below the vapor pressure of the oxidizer for a temperature of the oxidizer at a location upstream of the nozzle to ensure that the oxidizer is in a gas state when flowing into the nozzle of the attitude  
25 control system.

13. The method of claim 12, further comprising flowing the oxidizer into an accumulator downstream of the pressure regulator.

14. The method of claim 12, further comprising flowing the oxidizer into a nozzle downstream of the pressure regulator such that only oxidizer in the gas state flows into the nozzle.

5 15. The method of claim 12, wherein the hybrid rocket motor includes a supply of solid rocket fuel, and wherein the oxidizer interacts with the solid rocket fuel to generate thrust from the hybrid rocket motor.

16. The method of claim 12, wherein the oxidizer comprises Nitrous Oxide.

10 17. The method of claim 12, additionally comprising generating no more than 0.5 lbf of thrust by the attitude and control system.

18. A propulsion system for a spacecraft, comprising:  
15 a supply of oxidizer;  
at least one nozzle;  
a conduit fluidly coupling the supply of oxidizer and the nozzle, wherein the conduit provides a pathway for oxidizer to flow in a downstream direction from the supply of oxidizer toward and into the nozzle;  
20 a pressure regulator coupled to the conduit and interposed between the supply of oxidizer and the nozzle, wherein the pressure regulator regulates the pressure of oxidizer flowing through the conduit and downstream of the pressure regulator to pressure a at or below a first pressure, wherein the first pressure comprises the pressure required to maintain the oxidizer in a gas state to ensure that  
25 the any oxidizer flowing through the conduit is in a gas state prior to entering the nozzle; and  
a hybrid rocket motor, wherein the conduit supplies oxidizer from the supply of oxidizer to the hybrid rocket motor.

30 19. The system of claim 1, wherein the oxidizer comprises Nitrous Oxide.

20. The system of claim 2, wherein the supply of oxidizer contains Nitrous Oxide simultaneously in both a gas state and a liquid state.

21. The system of claim 3, wherein oxidizer located in the conduit  
5 upstream of the pressure regulator is in a liquid state.